

REMARKS/ARGUMENTS

Claims 1-20 and new Claims 21-23 are active in the case. Reconsideration is respectfully requested.

Applicants' representative wishes to thank Examiner Sackey for the helpful and courteous interview of April 4, 2007. As a result of the discussion, it is believed that the issues in the case have been clarified and that the prosecution of the application has been materially advanced.

The present invention relates to a process for preparing at least one partial oxidation and/or ammoxidation product of a hydrocarbon.

Specification Amendments

The specification has been amended in order to introduce appropriate section headings therein. Entry of the amendments is respectfully requested.

Claim Amendments

New Claims 21-23 have been submitted for consideration. The subject matter of newly submitted Claim 21 can be found at page 5, lines 5-7 of the text. Support for new Claims 22 and 23 can be found at page 9, lines 9-12 of the text. None of the claims are believed to have raised new issues after the final action. In fact, all three of the claims are dependent claims which further narrow the scope of aspects of the invention. Accordingly, entry of the new claims into the record is respectfully requested.

Invention

The basis of the process of the present invention is in the well known procedure of preparing an at least one partial oxidation and/or ammoxidation product of a hydrocarbon by

subjecting at least one saturated hydrocarbon (H) to a heterogeneously catalyzed dehydrogenation in the gas phase to form a product gas mixture (A) which is comprised of at least one partially dehydrogenated hydrocarbon (H).

The components different from the partially dehydrogenated hydrocarbon (H) and the saturated hydrocarbon (H) can be partly or completely removed from the gas mixture (A) to form a gas mixture (A'). Gas mixture (A) and/or gas mixture (A') are used to form a gas mixture (B), and the resulting mixture (B) is subjected to partial oxidation and/or ammoxidation over a heterogeneous catalyst, thereby effecting conversion of the partially dehydrogenated hydrocarbon (H) brought into gas mixture (B) as part of gas mixture (A) and/or product gas mixture (A').

However, after some long term observation of this process, applicants have found that very fine particles of dehydrogenation catalyst are conveyed from the dehydrogenation zone into the subsequent zone where heterogeneously catalyzed partial oxidation and/or ammoxidation of the dehydrogenated hydrocarbon occurs. In fact, at least some of the fine catalyst particles settle into the fixed catalyst employed in the oxidation or ammoxidation zone, where, in the presence of excess oxygen, the fine catalyst particles can promote the undesired combustion of hydrocarbons to CO_2 and H_2O , as well as the reaction of hydrogen gas with oxygen to form water. These reactions are disadvantageous since they can result in undesired reactant consumption during the partial oxidation or ammoxidation of dehydrogenated hydrocarbon and other risks which can not be precisely identified beforehand. This discovery then has led to the present invention which is the removal of very fine particles of dehydrogenation catalyst from gas mixture (A) or gas mixture (A') before these gas mixtures enter the zone in which they are partially oxidized and/or ammoxidized. Thus, the problems which attend the presence of very fine dehydrogenation catalyst particles in the oxidation or ammoxidation zone are avoided.

Prior Art Rejection

As to the matter of the relevance of the cited and applied '463 reference, while it clearly discloses the partial oxidation of an unsaturated light hydrocarbon such as propylene over a heterogeneous catalyst to form a partially oxidized product such as acrolein in paragraph [0024] and succeeding paragraphs, nevertheless, the reference discloses that the starting unsaturated hydrocarbon is produced by a process of oxydehydrogenation of a starting saturated hydrocarbon such as propane over an oxydehydrogenation catalyst such as one of those disclosed in paragraphs [0019] and [0020]. What the reference does not teach or suggest is the catalytic dehydrogenation of a saturated hydrocarbon that occurs in the presence of a non-oxygen containing atmosphere over a dehydrogenation catalyst. It is noted that the Examiner states in paragraph 3 on page 4 of the Office Action that in applicants' claimed process for preparing at least one partial oxidation and/or ammoxidation product of propylene, crude propane is subjected to a homogeneously and/or heterogeneously catalyzed dehydrogenation and/or oxydehydrogenation reaction. This is incorrect. The dehydrogenation of a saturated hydrocarbon such as propane in applicants' process never occurs by oxydehydrogenation, but by catalytic dehydrogenation which many times can be conducted in a reducing (hydrogen containing) atmosphere. A dehydrogenation catalyst is used to catalyze the dehydrogenation reaction (a type of catalyst not used to promote oxydehydrogenation reactions), and it is this dehydrogenation catalyst that results in the formation of the very fine catalyst particles that previously had been conveyed from the dehydrogenation zone to the subsequent or following oxidation zone where unsaturated hydrocarbon (propene) is oxidized to the partially oxidized hydrocarbon (acrolein). Even if small particles of such an oxydehydrogenation catalyst would be conveyed from the oxydehydrogenation zone to the subsequent or following oxidation zone where unsaturated hydrocarbon is partially oxidized, such particles would not cause the problems

dehydrogenation catalyst particles cause in said zone (the underlying catalytic mechanism is different.) Consequently, the '463 reference does not address applicants' solid particle removal procedure. Moreover, there is no teaching or suggestion in the reference that patentees ever contemplate the catalytic dehydrogenation of a saturated hydrocarbon, but only disclose catalytic oxydehydrogenation. It is therefore evident that the reference could not and does not teach the removal of very fine particles of dehydrogenation catalyst from a product stream comprised of newly or freshly formed unsaturated hydrocarbon (propene). Applicants' therefore do not concur with the statement in the Office Action that applicants' argument "does not give rise to any patentable subject matter, the separation of solid particles, that applicants presume to be the patentable distinction must be claimed with other significant steps." To the contrary, the single recited step of the mechanical separation of very fine catalyst particles subsequent to the dehydrogenation step stands alone, and is believed to be patentable when understood in context. Accordingly, the rejections of the present claims based on 35 USC 102 and 35 USC 103 fail and must be withdrawn.


It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

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